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EXAMINER
KRECK, JOHN J

ART UNIT	PAPER NUMBER
3673	

DATE MAILED: 01/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/841,433	Applicant(s) WELLINGTON ET AL.
	Examiner John Kreck	Art Unit 3673

-- The MAILING DATE of this communication appears on the cover sheet with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 September 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1883-1960 and 5397-5415* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1883-1960 and 5397-5415* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 September 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *14,15,17* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

The amendment dated 9/16/02 has been entered.

Claims 1883-1960 and 5397-5415 are pending in this application.

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1883-1960 and 5397-5403 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over copending applications (including the present application): 09/840,936; 09/840,937; 09/841,000; 09/841,060; 09/841,061; 09/841,127; 09/841,128; 09/841,129; 09/841,130; 09/841,131; 09/841,170; 09/841,193; 09/841,194; 09/841,195; 09/841,238; 09/841,239; 09/841,240; 09/841,283; 09/841,284; 09/841,285; 09/841,286; 09/841,287; 09/841,288; 09/841,289; 09/841,290; 09/841,291; 09/841,292; 09/841,293; 09/841,294; 09/841,295; 09/841,296; 09/841,297; 09/841,298; 09/841,299; 09/841,300; 09/841,301; 09/841,302; 09/841,303; 09/841,304; 09/841,305; 09/841,306; 09/841,307; 09/841,308; 09/841,309; 09/841,310; 09/841,311; 09/841,312; 09/841,429; 09/841,430; 09/841,431; 09/841,432; 09/841,433; 09/841,434; 09/841,435; 09/841,436; 09/841,437; 09/841,438; 09/841,439; 09/841,440; 09/841,441; 09/841,442; 09/841,443; 09/841,444; 09/841,445; 09/841,446; 09/841,447; 09/841,448; 09/841,449; 09/841,488; 09/841,489; 09/841,490; 09/841,491; 09/841,492; 09/841,493; 09/841,494; 09/841,495; 09/841,496; 09/841,497; 09/841,498; 09/841,499; 09/841,500; 09/841,501; 09/841,502; 09/841,632; 09/841,633; 09/841,634; 09/841,635; 09/841,636; 09/841,637; 09/841,638; and 09/841,639.

Although the conflicting claims are not identical, they are not patentably distinct from other. At least one other application includes a set of claims which are

substantially identical to the claims in this application; but which call for coal containing formation rather than hydrocarbon. Since applicant has defined hydrocarbon containing formation as including coal; this would be an obvious variation.

37 CFR 1.78(b) provides that when two or more applications filed by the same applicant contain conflicting claims, elimination of such claims from all but one application may be required in the absence of good and sufficient reason for their retention during pendency in more than one application. The discussion below sets forth the Office's basis for its determination that each of these ninety one applications contains at least one claim that conflicts with another one of the related co-pending applications identified above. Each of these ninety one applications includes the same specification and collectively these ninety one applications present over five thousand claims. The Office has shown that each of these ninety one applications contains at least one claim that conflicts with another one of the related co-pending applications identified above, and an analysis of each of five thousand claims in the ninety one related co-pending applications would be an extreme burden on the Office requiring tens of thousands of claim comparisons. Therefore, the Office is requiring applicant to resolve the conflict between these applications and comply with 37 CFR 1.78(b) by either:

(1) filing a terminal disclaimer in each of the related ninety-one applications terminally disclaiming each of the other ninety applications; or,

(2) provide a statement that all claims in the ninety applications have been reviewed by applicant and that no conflicting claims exist between the

applications. Such a statement must set forth factual information to identify how all the claims in the instant application are distinct and separate inventions from all the claims in the above identified ninety applications.

See MPEP 804.02 IV for a discussion of multiple double patenting rejections and the requirements for a single terminal disclaimer.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> **(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.**

3. Claims 1883-1889,1893-1906,1909-1911, 1916-1918, 5398, 5399, 5400, 5401, 5406-5408, 5410, 5411, 5412, 5413, and 5414 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai, et al. (U.S. Patent number 4,299,285).

The Tsai reference teaches a method for treating a hydrocarbon formation in situ comprising providing heat from one or more heaters to a portion of the formation; allowing heat to transfer, and producing a mixture. The Tsai reference fails to disclose the formation has a at least a portion with an atomic hydrogen to carbon ratio of greater than 0.70 and less than 1.65. According to "Coalbed Methane" (see, in particular figure 2.5; and the text in section 2.2.2, third paragraph) most coals include portions which fall

within this range; thus it would have been obvious to one of ordinary skill in the art at the time of the invention to have practiced the Tsai method in a coal seam having at least a portion with an atomic hydrogen to carbon ratio of greater than 0.70 and less than 1.65 as called for in claim 1883.

With regards to claim 1884; the Tsai reference fails to explicitly teach the superposition of heaters. It is apparent that one of ordinary skill in the art would know that the heat sources should be spaced to substantially heat the entire formation. Any configuration of heat sources that provides heat to the entire formation would inherently cause superposition of heat (this is shown by Van Meurs, et al., already of record); thus it would have been obvious to one of ordinary skill in the art at the time of the invention to have further modified the Tsai method to have included superposition of heat as called for in claim 1884; in order to ensure that the entire formation is heated.

With regards to claim 1885; the Tsai reference teaches a pyrolysis temperature range within a section of the formation (see col. 4, line 54).

With regards to claim 1886, electrical heaters are well known to heat air. It would have been obvious to one of ordinary skill in the art at the time of the invention to have used an electrical heater with the Tsai process as called for in claim 1886, in order to heat the air.

With regards to claim 1887, surface burners are well known to heat air. It would have been obvious to one of ordinary skill in the art at the time of the invention to have used a surface burner with the Tsai process as called for in claim 1887, in order to heat the air.

With regards to claim 1888; the Tsai reference teaches a flameless combustor (see col. 2, line 32).

With regards to claim 1889; the Tsai reference teaches a natural distributed combustor (see col. 2, line 32).

With regards to claim 1893; the Tsai reference does not explicitly teach the transferring by conduction; however this is inherent in a solid substance such as coal. Even though the bulk of the heating in the Tsai method may be done by convection; it is apparent that some unfractured coal must remain, and thus the allowing heat to transfer comprises transferring heat substantially by conduction (that is, substantially within the unfractured portions).

With regards to claim 1894; the Tsai reference does not teach the thermal conductiviy; however, it would have been further obvious to one of ordinary skill in the art at the time of the invention to have practiced the Tsai method in a coal seam having a thermal conductivity of greater than about 0.5W/(m°C) as called for in claim 1894; such a formation would be a desirable choice because it would heat more uniformly.

With regards to claims 1895-1906, 1910, and 1911; the nature of hydrocarbons produced from such heating is highly variable, and dependent upon many factors, not least of which is the characteristics of the coal. The components of the produced mixture are deemed to be the results of design variables, including coal characteristics and temperature.

With regards to claim 1909, the Tsai reference teaches the pressure greater than 2.0 bar.

With regards to claims 1916 and 1917; the Tsai reference teaches the permeability greater than about 100 md in table 1. The uniform increase in permeability is inherent.

With regards to claim 1918, although the Tsai reference fails to explicitly disclose a Fischer Assay; it is apparent that the disclosed process will yield greater than 60%.

With regards to claim 5398; it is apparent that Tsai anticipates a selected section.

With regards to claim 5399; Tsai also teaches a pyrolysis zone.

With regards to claim 5400; Tsai also teaches a pyrolysis zone proximate at least one heater.

With regards to claim 5401; Tsai fails to explicitly disclose the open wellbore, however the wellbore must be open, otherwise the air would not flow into the formation.

Regarding independent claim 5406:

The Tsai reference teaches a method for treating a hydrocarbon formation in situ comprising providing heat from one or more heat sources to a part of the formation; and allowing heat to transfer. The Tsai reference fails to disclose the formation has a at least a portion with an atomic hydrogen to carbon ratio of greater than 0.70 and less than 1.65. According to "Coalbed Methane" (see, in particular figure 2.5; and the text in section 2.2.2, third paragraph) most coals include portions which fall within this range; thus it would have been obvious to one of ordinary skill in the art at the time of the invention to have practiced the Tsai method in a coal seam having at least a portion with an atomic hydrogen to carbon ratio of greater than 0.70 and less than 1.65 as called for in claim 5406.

With regards to claim 5407; the Tsai reference fails to explicitly teach the superposition of heaters. It is apparent that one of ordinary skill in the art would know that the heat sources should be spaced to substantially heat the entire formation. Any configuration of heat sources that provides heat to the entire formation would inherently cause superposition of heat; thus it would have been obvious to one of ordinary skill in the art at the time of the invention to have further modified the Tsai method to have included superposition of heat as called for in claim 5407; in order to ensure that the entire formation is heated.

With regards to claim 5408; the Tsai reference teaches a pyrolysis temperature range within a section of the formation (see col. 4, line 54).

With regards to claim 5410; the nature of hydrocarbons produced from such heating is highly variable, and dependent upon many factors, not least of which is the characteristics of the coal. The components of the produced mixture are deemed to be the results of design variables, including coal characteristics and temperature.

With regards to claim 5411; it is apparent that Tsai anticipates a selected section.

With regards to claims 5412; Tsai also teaches a natural distributed combustor.

With regards to claim 5413; Tsai fails to explicitly disclose the open wellbore, however the wellbore must be open, otherwise the air would not flow into the formation.

With regards to claim 5414; Tsai teaches the increase in permeability, the uniformity is inherent.

4. Claims 1890 and 5409 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai in view of Elkins (U.S. Patent number 2,734,579).

The Tsai reference fails to teach the controlling the temperature and pressure wherein the temperature is controlled as a function of the pressure or the pressure is controlled as a function of the temperature.

Elkins teaches controlling the pressure in order to lower the temperature (col. 3, line 46); this is done in order to help prevent overheating. It would have been obvious to one of ordinary skill in the art at the time of the invention to have further modified the Tsai process to have included the temperature is controlled as a function of the pressure or the pressure is controlled as a function of the temperature as called for in claims 1890 and 5409, and as taught by Elkins, in order to prevent overheating.

5. Claims 1891;1892;and 5415 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai in view of Kasevich, et al. (U.S. Patent number 4,457,365).

The Tsai reference fails to teach the heating rate. With regards to claim 1892 and 5415; it is known to heat at rates of less than 10°C per day, as shown by Kasevich (figure 3). It is apparent that this low heating rate is desirable because it results in more uniform heating, and reduces the possibility of hot spots. It would have been obvious to one of ordinary skill in the art at the time of the invention to have further modified the Tsai method to have included heating at a rate of less than about 10°C per day as called for in claims 1892 and 5415, in order to achieve more uniform heating. The claim limitations drawn to the heating energy are nothing more than well known thermodynamic equations.

With regards to claim 1891; it is noted that Kasevich teaches an average of approximately 1.6°/day. It is apparent that when the temperature reaches its highest

point (the point at which pyrolysis occurs) the rate of increase would be at the slowest; thus it would be less than about 1°C/day. It would have been further obvious to one of ordinary skill in the art at the time of the invention to have further modified the Tsai method to have included heating at less than about 1°C/day during pyrolysis as called for in claim 1891; in order to achieve more uniform heating.

6. Claims 1907 and 1908 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai, et al. in view of Stoddard, et al. (U.S. Patent number 4,463,807).

The Tsai reference fails to explicitly teach the ammonia.

It is well known that ammonia is a byproduct of such heating of coal. This is taught by Stoddart. It is readily apparent that the amount of ammonia is dependent on many design factors, including the formation characteristics (hydrocarbon content, etc.). It would have been obvious to one of ordinary skill in the art at the time of the invention to have practiced the Tsai method, as modified, in a formation with characteristics allowing greater than 0.05% of the produced mixture to be ammonia, as called for in claim 1907.

With regards to claim 1908; it is well known that one of the chief uses for ammonia is fertilizer; thus it would have been further obvious to one of ordinary skill in the art at the time of the invention to have used ammonia produced form the coal seam for fertilizer as called for in claim 1908.

7. Claims 1912-1915 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai, et al. in view of Gregoli, et al. (U.S. Patent number 6,016,867).

The Tsai reference fails to teach the altering pressure to inhibit production of hydrocarbons having carbon numbers greater than about 25. The Gregoli reference teaches that in a similar in-situ processes, it is beneficial to use high pressure to break heavy hydrocarbons. It is well known that carbons having carbon numbers greater than about 25 are considered to be heavy; and impede production because they are dense and viscous. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the Tsai method to have included altering pressure to inhibit production of hydrocarbons having carbon numbers greater than about 25, as called for in claim 1912, in order to improve production.

The Tsai reference fails to teach the recirculating hydrogen, providing hydrogen, or hydrogenating. The Gregoli reference teaches that in a similar in-situ processes, it is beneficial to use hydrogen to hydrogenate heavy hydrocarbons. It is well known that carbons having carbon numbers greater than about 25 are considered to be heavy; and impede production because they are dense and viscous. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the Tsai method to have included recirculating hydrogen as called for in claims 1913; providing hydrogen as called for in claims 1914; and hydrogenating as called for in claims 1915; in order to reduce the heavy hydrocarbons and to improve production.

8. Claim 1919 and 1920 and 5396 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai, et al. (U.S. Patent number 4,299,285) in view of Van Meurs, et al. (U.S. Patent number 4,886,118).

The Tsai reference fails to teach the at least about 7 heaters for each production well. Note that Tsai teaches: "*the principles are applicable to a multiple of interrelated injection and production wells*" (col. 2, line 8).

The Van Meurs reference teaches a similar in situ heating system, and further teaches that six or twelve heaters for each production well significantly increases the production (col. 8, line 24).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the Tsai method to have included at least about 7 heaters disposed in the formation for each production well, as called for in claim 1919, in order to improve production.

With regards to claim 1920; the Van Meurs reference teaches the heat sources surrounding the production well; since this includes at least 3 sources this inherently includes a triangle. It would have been further obvious to one of ordinary skill in the art at the time of the invention to have further modified the Tsai method to have included at least 3 sources in a triangle as called for in claim 1920, in order to increase production.

With regards to claim 5396; is apparent that the number of heat sources is largely a matter of engineering design. It would have been obvious to one of ordinary skill in the art at the time of the invention to have used at least about 20 heat sources for each production well, as called for in claim 5396, based on the desired heating rate and formation heat transmission characteristics.

9. Claim 1921 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai, at al.; Van Meurs, et al.; and Salomonsson (U.S. Patent number 2,914,309).

The Van Meurs and Tsai references fail to explicitly teach the unit of heat sources in a triangular pattern and the plurality of units in a repetitive pattern. It is noted that the Van Meurs reference teaches the heat sources surrounding the production well, which would inherently include a triangular pattern.

Salomonsson teaches that it is desirable to have a repetitive pattern in order to cover the area evenly. It is apparent that this is beneficial in order to prevent hot spots. It would have been further obvious to one of ordinary skill in the art at the time of the invention to have further modified the Tsai method to have included a unit of a triangular pattern and a repetitive pattern of units as called for in claim 1921; in order to cover the area evenly.

Regarding independent claim 1922:

The Tsai reference teaches a method for treating a hydrocarbon formation in situ comprising providing heat from one or more heaters to a portion of the formation; allowing heat to transfer, and producing a mixture. The Tsai reference fails to disclose the formation has a at least some hydrocarbons with an atomic hydrogen to carbon ratio of greater than 0.70 and less than 1.65. According to "Coalbed Methane" (see, in particular figure 2.5; and the text in section 2.2.2, third paragraph) most coals include portions which fall within this range; thus it would have been obvious to one of ordinary skill in the art at the time of the invention to have practiced the Tsai method in a coal seam having at least a portion with an atomic hydrogen to carbon ratio of greater than 0.70 and less than 1.65 as called for in claim 1922.

With regards to claim 1923; the Tsai reference fails to explicitly teach the superposition of heat sources. It is apparent that one of ordinary skill in the art would know that the heat sources should be spaced to substantially heat the entire formation. Any configuration of heat sources that provides heat to the entire formation would inherently cause superposition of heat (this is shown by Van Meurs, et al., already of record); thus it would have been obvious to one of ordinary skill in the art at the time of the invention to have further modified the Tsai method to have included superposition of heat as called for in claim 1884; in order to ensure that the entire formation is heated.

With regards to claim 1924; the Tsai reference teaches a pyrolysis temperature range within a section of the formation (see col. 4, line 54).

With regards to claim 1925, electrical heaters are well known to heat air. It would have been obvious to one of ordinary skill in the art at the time of the invention to have used an electrical heater with the Tsai process as called for in claim 1925, in order to heat the air.

With regards to claim 1926, surface burners are well known to heat air. It would have been obvious to one of ordinary skill in the art at the time of the invention to have used a surface burner with the Tsai process as called for in claim 1926, in order to heat the air.

With regards to claim 1927; the Tsai reference teaches a flameless combustor (see col. 2, line 32).

With regards to claim 1928; the Tsai reference teaches a natural distributed combustor (see col. 2, line 32).

With regards to claim 1932; the Tsai reference does not explicitly teach the transferring by conduction; however this is inherent in a solid substance such as coal. Even though the bulk of the heating in the Tsai method may be done by convection; it is apparent that some unfractured coal must remain, and thus the allowing heat to transfer comprises transferring heat substantially by conduction (that is, substantially within the unfractured portions).

With regards to claim 1933; the Tsai reference does not teach the thermal conductiviy; however, it would have been further obvious to one of ordinary skill in the art at the time of the invention to have practiced the Tsai method in a coal seam having a thermal conductivity of greater than about 0.5W/(m°C) as called for in claim 1933; such a formation would be a desirable choice because it would heat more uniformly.

With regards to claims 1934-1945, 1949, and 1950; the nature of hydrocarbons produced from such heating is highly variable, and dependent upon many factors, not least of which is the characteristics of the coal. The components of the produced mixture are deemed to be the results of design variables, including coal characteristics and temperature. Also, specifically with respect to claims 1937-1939; hydrocarbons produced using the Tsai method inherently have less than 1% nitrogen, oxygen, or sulfur.

With regards to claim 1948, the Tsai reference teaches the pressure greater than 2.0 bar.

With regards to claims 1955 and 1956; the Tsai reference teaches the permeability greater than about 100 md in table 1. The uniform increase in permeability is inherent.

With regards to claim 1957, although the Tsai reference fails to explicitly disclose a Fischer Assay; it is apparent that the disclosed process will yield greater than 60%.

10. Claim 1929 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai in view of Elkins (U.S. Patent number 2,734,579).

The Tsai reference fails to teach the controlling the temperature and pressure wherein the temperature is controlled as a function of the pressure or the pressure is controlled as a function of the temperature.

Elkins teaches controlling the pressure in order to lower the temperature (col. 3, line 46); this is done in order to help prevent overheating. It would have been obvious to one of ordinary skill in the art at the time of the invention to have further modified the Tsai process to have included the temperature is controlled as a function of the pressure or the pressure is controlled as a function of the temperature as called for in claim 1929, and as taught by Elkins, in order to prevent overheating.

11. Claims 1930 and 1931 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai in view of Kasevich, et al. (U.S. Patent number 4,457,365).

The Tsai reference fails to teach the heating rate. With regards to claim 1931; it is known to heat at rates of less than 10°C per day, as shown by Kasevich (figure 3). It is apparent that this low heating rate is desirable because it results in more uniform heating, and reduces the possibility of hot spots. It would have been obvious to one of ordinary skill in the art at the time of the invention to have further modified the Tsai method to have included heating at a rate of less than about 10°C per day as called for in claim 1931, in order to achieve more uniform heating. The claim limitations drawn to the heating energy are nothing more than well known thermodynamic equations.

With regards to claim 1930; it is noted that Kasevich teaches an average of approximately 1.6°/day. It is apparent that when the temperature reaches its highest point (the point at which pyrolysis occurs) the rate of increase would be at the slowest; thus it would be less than about 1°C/day. It would have been further obvious to one of ordinary skill in the art at the time of the invention to have further modified the Tsai method to have included heating at less than about 1°C/day during pyrolysis as called for in claim 1930; in order to achieve more uniform heating.

12. Claims 1946 and 1947 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai, et al. in view of Stoddard, et al. (U.S. Patent number 4,463,807).

The Tsai reference fails to explicitly teach the ammonia.

It is well known that ammonia is a byproduct of such heating of coal. This is taught by Stoddart. It is readily apparent that the amount of ammonia is dependent on

many design factors, including the formation characteristics (hydrocarbon content, etc.). It would have been obvious to one of ordinary skill in the art at the time of the invention to have practiced the Tsai method, as modified, in a formation with characteristics allowing greater than 0.05% of the produced mixture to be ammonia, as called for in claim 1946.

With regards to claim 1947; it is well known that one of the chief uses for ammonia is fertilizer; thus it would have been further obvious to one of ordinary skill in the art at the time of the invention to have used ammonia produced form the coal seam for fertilizer as called for in claim 1947.

13. Claims 1951-1954 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai, et al. in view of Gregoli, et al. (U.S. Patent number 6,016,867).

The Tsai reference fails to teach the altering pressure to inhibit production of hydrocarbons having carbon numbers greater than about 25. The Gregoli reference teaches that in a similar in-situ processes, it is beneficial to use high pressure to break heavy hydrocarbons. It is well known that carbons having carbon numbers greater than about 25 are considered to be heavy; and impede production because they are dense and viscous. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the Tsai method to have included altering pressure to inhibit production of hydrocarbons having carbon numbers greater than about 25, as called for in claim 1951, in order to improve production.

The Tsai reference fails to teach the recirculating hydrogen, providing hydrogen,

or hydrogenating. The Gregoli reference teaches that in a similar in-situ processes, it is beneficial to use hydrogen to hydrogenate heavy hydrocarbons. It is well known that carbons having carbon numbers greater than about 25 are considered to be heavy; and impede production because they are dense and viscous. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the Tsai method to have included recirculating hydrogen as called for in claims 1952; providing hydrogen as called for in claims 1953; and hydrogenating as called for in claims 1954; in order to reduce the heavy hydrocarbons and to improve production.

14. Claims 1958 and 1959 and 5397 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai, et al. (U.S. Patent number 4,299,285) in view of Van Meurs, et al. (U.S. Patent number 4,886,118).

The Tsai reference fails to teach the at least about 7 heat sources for each production well. Note that Tsai teaches: "*the principles are applicable to a multiple of interrelated injection and production wells*" (col. 2, line 8).

The Van Meurs reference teaches a similar in situ heating system, and further teaches that six or twelve heat sources for each production well significantly increases the production (col. 8, line 24).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the Tsai method to have included at least about 7 heat sources disposed in the formation for each production well, as called for in claim 1958, in order to improve production.

With regards to claim 1959; the Van Meurs reference teaches the heat sources surrounding the production well; since this includes at least 3 sources this inherently includes a triangle. It would have been further obvious to one of ordinary skill in the art at the time of the invention to have further modified the Tsai method to have included at least 3 sources in a triangle as called for in claim 1959, in order to increase production.

With regards to claim 5397; is apparent that the number of heat sources is largely a matter of engineering design. It would have been obvious to one of ordinary skill in the art at the time of the invention to have used at least about 20 heat sources for each production well, as called for in claim 5397, based on the desired heating rate and formation heat transmission characteristics.

15. Claim 1960 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai, at al.; Van Meurs, et al.; and Salomonsson (U.S. Patent number 2,914,309).

The Van Meurs and Tsai references fail to explicitly teach the unit of heat sources in a triangular pattern and the plurality of units in a repetitive pattern. It is noted that the Van Meurs reference teaches the heat sources surrounding the production well, which would inherently include a triangular pattern.

Salomonsson teaches that it is desirable to have a repetitive pattern in order to cover the area evenly. It is apparent that this is beneficial in order to prevent hot spots. It would have been further obvious to one of ordinary skill in the art at the time of the invention to have further modified the Tsai method to have included a unit of a triangular pattern and a repetitive pattern of units as called for in claim 1960; in order to cover the area evenly.

Response to Arguments

Applicant's arguments filed 9/16/02 have been fully considered but they are not persuasive.

With regards to independent claims 1883 and 1922; applicant has argued that the Tsai reference fails to teach or suggest "providing heat from one or more heaters to at least a portion of the formation". Applicant also provides text from the specification to support a definition of "heater", which would exclude the fire taught by Tsai.

It is noted that applicant's specification also includes much broader definitions of "heater", which include fire:

> *"Combustion of a fuel may be used to heat a formation. Combusting a fuel to heat a formation may be more economical than using electricity to heat a formation. Several different types of heaters may use fuel combustion as a heat source that heats a formation. The combustion may take place in the formation, in a well and/or near the surface. Combustion in the formation may be a fireflood."*
> (page 3, lines 20-28)

Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

With regards to claims 1884 and 1923; applicant has argued that superposition is not taught or suggested by Tsai. In response to applicant's suggestion to supply a reference in accordance with MPEP 2144.03; see Van Meurs, et al. (U.S. Patent

number 4,886,118). Although Van Meurs fails to use the term "superposition", it is apparent that the transfer of heat shown by figure 7 is a result of superposition.

With regards to claim 1886 and 1925; in response to applicant's request for evidence---see applicant's own specification page 2, lines19-29.

With regards to claim 1887 and 1926; in response to applicant's request for evidence---see applicant's own specification page 4, lines 8-14.

Regarding claims 1888,1889, 1927, and 1928; applicant has not provided arguments to show how the Tsai heater differs from the claimed natural distributed combustor or flameless combustor.

With regards to claim 1893 and 1932; it is noted that the claim broadly calls for "comprises transferring heat substantially by conduction" (emphasis added). It should be abundantly clear that heat transfer in a solid substance such as coal inherently includes conduction.

With regards to claim 1894 and 1933; in response to applicant's request for evidence---see "Coal: Typology-Physics-Chemistry-Constitution"; in particular pages 526 and 527; which shows most coals having a thermal conductivity above 0.5 W/m°C.

With regards to claims 1895-1906, 1909, 1910, 1911, 1934-1945, 1948, 1949, 1950, 1955; applicant's statements that "The features of claim ###, in combination with the features of independent claim 1883, do not appear to be taught or suggested by the cited art." are not at all persuasive. With further regards to applicant's request for a reference (as per MPEP 2144.03); applicant has not specifically pointed out what facts

are at issue, however the attached pages from "Coal: Typology-Physics-Chemistry-Constitution" provide evidence that coal is highly variable.

With regards to claims 1916, 1917, 1955 and 1956; applicant has failed to provide any evidence that the uniform increase of permeability is not inherent. MPEP 2144.03 does not apply because Tsai clearly teaches increasing the permeability.

With regards to claim 1918; applicant has not shown any evidence that the volatile content of coal is the same as the yield. Note that since the volatile content is reported along with ash content, it clearly cannot be equated to yield. With regards to applicant's assertion that MPEP 2144.03 applies to this rejection; examiner has asserted that the yield is inherent; burden is on applicant to show that it is not inherent.

With regards to claim 1890 and 1929; Elkins explicitly teaches "decreasing the injection gas pressure also decreases the combustion zone temperature" (col. 3, line 46). Applicant's own specification discloses:

"In an alternative embodiment, a fluid (e.g., liquid or gas) may be injected in the innermost row of wells, allowing a selected pressure to be maintained in or about the pyrolysis zone."(emphasis added)

Applicant's arguments that the controlling of injection pressure taught by Elkins does not meet the claimed limitation are therefore not persuasive.

With regards to claims 1891 1930, 1931, and 1892; Kasevich inherently teaches that the rate of increase of temperature stops (e.g. at the disclosed maximum temperatures---col. 15 line 65 through col. 16, line 11) since the increase of

temperature stops, the heating must inherently comprise a rate of increase less than 1.6°C. With regards to applicant's further arguments concerning the Kasevich reference; the claims do not call for "using a desired heating rate to calculate a maximum amount of heating". Kasevich clearly teaches the slow heating rate.

With regards to claims 1907, 1902,1946, and 1947; applicant's arguments that Stoddard fails to teach the 0.05% ammonia are misplaced---the rejection is that the percent ammonia would be obvious based on design factors, including formation characteristics.

Applicant's arguments concerning the Gregoli reference and claims 1912-1915, and 1951-1954 are not persuasive. Applicant's assertion that the Gregoli process of converting high molecular weight hydrocarbons (e.g. greater than 25 carbon number) into lower weight does not anticipate "to inhibit production...having carbon numbers greater than about 25" is simply not persuasive. Applicant's further assertions concerning the providing hydrogen are clearly contradicted by figure 1 of Gregoli.

With regards to claims 1919-1921, 1958-1959, 5396, and 5397; applicant's assertions that the claims are patentable because the independent claim is patentable are not persuasive. Applicant's further statements that "The features of claim ###, in combination with the features of independent claim 1883, do not appear to be taught or suggested by the cited art." are not at all persuasive. MPEP 2144.03 does not apply because van Meurs clearly teaches increasing the number of heat sources.

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Kreck whose telephone number is (703)308-2725. The examiner can normally be reached on M-F 6:00 am - 3:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Heather Shackelford can be reached on (703)308-2978. The fax phone numbers for the organization where this application or proceeding is assigned are (703)305-3597 for regular communications and (703)305-7687 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)306-4177.

JJK
December 9, 2002

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